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| 10/501,405      | 07/15/2004  | Masashi Gabe         | 953.1017            | 2649             |

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STAAS & HALSEY LLP  
SUITE 700  
1201 NEW YORK AVENUE, N.W.  
WASHINGTON, DC 20005

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| EXAMINER |
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NGUYEN, TU MINH

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| ART UNIT | PAPER NUMBER |
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3748

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09/28/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/501,405

Applicant(s)

GABE ET AL.

Examiner

Tu M. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3,5,6,8,10 and 13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,5,6,8,10 and 13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. In view of an Applicant's Appeal Brief filed on June 6, 2007, PROSECUTION IS HEREBY REOPENED. A new non-final rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office Action is non-final) or a reply under 37 CFR 1.113 (if this Office Action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Overall, claims 1, 3, 5, 6, 8, 10, and 13 are pending in this application.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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**2. Claims 1, 5, 6, 10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pott (U.S. Patent 5,992,142) (Pott'142) in view of Pott (U.S. Patent 6,164,064) (Pott'064) and Ito et al. (U.S. Patent 6,378,297).**

Re claims 1, 6, and 13, as shown in Figures 1, 2, and 4, Pott'142 discloses an exhaust gas purifying system and a method of exhaust gas purification to be carried out with use of said exhaust gas purifying system provided with a NOx occlusion reduction type catalyst (7) having a catalyst metal (platinum) and a NOx occluding substance (alkali or alkaline earth metal) that is transformed into nitrate as a result of occluding activities and is then regenerated back to allow continuation of NOx occlusion (see lines 12-15 of column 1 and lines 11-27 of column 4), in an exhaust passage (3) of a diesel engine (1) and a control unit (13) comprising a normal control operation means (non-regeneration mode such as steps 21 and 23), a regeneration control initiation judging means (step 22) for detecting a regeneration control initiation timing for the NOx occlusion reduction type catalyst, a rich-burn control operation means (step 28 with "< LAMBDA RICH" answer and step 29) for executing a rich-burn control operation for generating an exhaust gas which is in a fuel-rich state, accompanying recirculation of exhaust gas (4), and a catalyst activation control operation means (step 28 with "< LAMBDA RICH" answer and step 29) for executing a control operation for activating the NOx occlusion reduction type catalyst immediately before the rich-burn control operation is performed, and performing the catalyst activation control operation by the catalyst activation control operation means when it is judged by the regeneration control initiation judging means that a regeneration control for the regeneration of the NOx occlusion reduction type catalyst is to be initiated (step 22 with YES answer) and thereafter executing a rich-burn control operation (step 28 with "< LAMBDA

RICH" answer and step 29) accompanying a recirculation of EGR gas by the rich-burn control operation means to thereby regenerate the NOx occlusion reduction type catalyst,

wherein the catalyst activation control operation means (step 28 with "< LAMBDA RICH" answer and step 29) executes a burning control in the rich vicinity of the stoichiometric air-fuel ratio in a range of less than 1.0 in the condition of an EGR flow rate being reduced (see lines 55-58 of column 6), and at the same time executing a fuel injection in the fuel injection into cylinders and controlling the torque generation of the diesel engine by an intake control (8) to reduce a torque variation during the transition from the normal control operation to the catalyst activation control operation (as clearly shown in Figure 4), and

wherein regeneration control is performed to thereby purge or release NOx from the NOx occlusion reduction type catalyst (7).

Pott'142 recognizes that the NOx catalyst (7) also adsorbs SOx in a lean air-fuel ratio control; wherein a purge or release of SOx is performed less often than that for NOx, and the temperature and time required for the purging of SOx are higher and longer, respectively, than those for purging NOx (see lines 26-34 of column 9).

Pott'142, however, fails to disclose that instead of rich, the catalyst activation control operation means executes a burning control in the vicinity of the stoichiometric air-fuel ratio in a range of 0.8 to 1.1 in terms of an excess air factor; that during the catalyst activation control operation means, the fuel is injected in a multi-stage with an early injection; and that a reduced EGR flow rate means that the EGR flow rate is cut-off with the EGR totally closed.

As illustrated in Figures 1 and 3, Pott'064 discloses a process to desulfurize a NOx occlusion reduction type catalyst (3) located in an exhaust path (2) of a diesel engine. During

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this process, Pott'064 teaches that it is conventional in the art to perform a catalyst activation control operation to raise a temperature of the catalyst to a desulfurization temperature (lines 57-60 of column 1); wherein the fuel is injected in a multi-stage with an early injection and an engine air-fuel ratio is set to oscillate about the stoichiometric air-fuel ratio (lines 1-7 of column 4). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Pott'064 in the system and method of Pott'142 because Pott'142 also needs to raise the NOx catalyst to a released temperature of NOx, since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively removed harmful NOx and SOx emissions in the exhaust gas.

Pott'142 discloses the claimed invention except for specifying an optimum range of an air-fuel ratio between 0.8 and 1.1 for the catalyst activation control operation means. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of excess air factor during the catalyst activation control operation means in Pott'142, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

As illustrated in Figure 1, Ito et al. disclose an air-fuel ratio control system for exhaust gas purification of a diesel internal combustion engine (1); wherein the system controls the operation of the engine to purge NOx and SOx from a NOx occlusion reduction type catalyst (22) located in an exhaust path (19) of the diesel engine. As shown in Figures 18 and 21 and indicated on lines 47-49 of column 15 and 66-67 of column 14, Ito et al. teach that during a NOx purge of the catalyst (22), it is conventional in the art to completely close an EGR valve (25),

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which results in a reduced or zero flow rate of EGR back to the engine. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Ito et al. in the system and method of Pott'142, since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively removed harmful NOx emissions in the exhaust gas.

Re claims 5 and 10, the modified system and method of Pott'142 comprise performing the rich-burn control operation to recirculate EGR gas to generate an exhaust gas which is in a fuel-rich state and to control the torque generation of the diesel engine by an intake control of the diesel engine to reduce a torque variation during the transition from the catalyst activation control operation to the rich-burn control operation (see Figure 4).

**3. Claims 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pott'142 in view of Pott'064 and Ito et al. as applied to claims 1 and 6, respectively, above, and further in view of Yokota et al. (U.S. Patent 6,269,634).**

The modified system and method of Pott'142 disclose the invention as cited above, however, fail to disclose that NOx occlusion reduction type catalyst comprises a reducer occluding substance.

As shown in Figures 1, 3, and 4, Yokota et al. disclose an engine control device for an exhaust system comprising a NOx occlusion reduction type catalyst (36); wherein the device is adapted to perform a NOx purge of the NOx catalyst with a time-split fuel injection at stoichiometric air-fuel ratio and with reduced or cut-off EGR (see Figure 3). As indicated on lines 53-60 of column 3, Yokota et al. teach that it is conventional in the art to utilize the NOx occlusion reduction type catalyst having a catalyst metal (platinum) and a NOx occluding

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substance (alkaline earth metal) deposited on an outer layer formed of zeolite which is known in the art as a reducer occluding substance. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the NOx occlusion reduction type catalyst taught by Yokota et al. in the modified system and method of Pott'142, since the use thereof would have been routinely practiced by those with ordinary skill in the art.

***Response to Arguments***

4. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are moot in view of the new ground(s) of rejection.



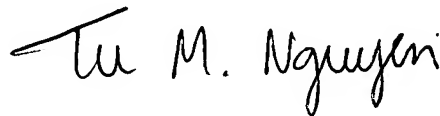
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*Communication*

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



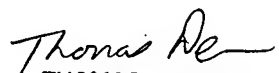
TMN

Tu M. Nguyen

September 17, 2007

Primary Examiner

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THOMAS DENION  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3700